

**PATENT APPLICATION**

**Attorney Docket No. 1111 008 301 0202**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE  
BOARD OF PATENT APPEALS AND INTERFERENCES**

Inventor:	<b>William A. Burris et al.</b>	Conf. No.:	<b>6883</b>
Application No.:	<b>10/074,992</b>	Group Art Unit:	<b>1744</b>
Filed:	<b>February 13, 2002</b>	Examiner:	<b>K. M. Jastrzab</b>
Title:	<b>OPERATORY WATER DISINFECTION SYSTEM</b>		

Mail Stop: **Appeal Brief – Patents**  
Honorable Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

**LETTER ACCOMPANYING APPEAL BRIEF**

In response to the Notice of Panel Decision from Pre-Appeal Brief Review (dated October 16, 2006) and based upon Appellant's Notice of Appeal submitted August 3, 2006, Appellants submit herewith a Brief on Appeal in the above-identified application. Appellants hereby petition for any required extension of time, and in the event that any additional fees are required as a result of this submission, including fees for filing the Appeal Brief and additional extensions of time, authorization is hereby provided to charge such fees or additional amounts to the Basch & Nickerson LLP Deposit Account 50-2737.

Respectfully submitted,

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William A. Burris and Philip M. Prinsen - Appellants

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**APPELLANTS' BRIEF ON APPEAL**

**TABLE OF CONTENTS**

	<b><u>PAGE</u></b>
<b>TABLE OF CASES .....</b>	<b>3</b>
<b>1. REAL PARTY IN INTEREST .....</b>	<b>4</b>
<b>2. RELATED APPEALS AND INTERFERENCES.....</b>	<b>4</b>
<b>3. STATUS OF CLAIMS .....</b>	<b>4</b>
<b>4. STATUS OF AMENDMENTS .....</b>	<b>4</b>
<b>5. SUMMARY OF CLAIMED SUBJECT MATTER .....</b>	<b>4</b>
<b>6. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL.....</b>	<b>11</b>
<b>7. ARGUMENT .....</b>	<b>12</b>
<b>8. CLAIMS APPENDIX .....</b>	<b>28</b>
<b>9. EVIDENCE APPENDIX.....</b>	<b>32</b>
<b>10. RELATED PROCEEDINGS APPENDIX.....</b>	<b>33</b>

**TABLE OF CASES**

**PAGE NO.**

In re Tiffin and Erdman, 170 USPQ 88 (CCPA, 1971) .....	12
In re Lintner, 173 USPQ 560, (CCPA, 1972) .....	13, 22
Graham v. John Deere Co., 383 US 1 (US Sup. Ct., 1966) .....	13
Panduit Corp. v. Dennison Mfg. Co., 1 USPQ2d 1593 (Fed. Cir., 1987) .....	13
In re Mills, 16 USPQ2d 1430 (Fed. Cir. 1990) .....	13
In re Kamm et al., 172 USPQ 298(CCPA, 1972) .....	13
In re Gordon, 221 USPQ 1125, (Fed. Cir., 1984) .....	13
Jones v. Hardy, 220 USPQ 1021, (Fed. Cir., 1984) .....	13
In re Vaeck, 20 USPQ2d 1438 (Fed. Cir. 1991).....	14
In re Zurko, 258 F.3d 1379, 59 USPQ2d 1693 (Fed. Cir. 2001) .....	23
In re Ahlert, 424 F.2d 1088, 165 USPQ 418 (CCPA 1970) .....	23

**1. REAL PARTY IN INTEREST**

ALAB, LLC. by assignment from Inventors/Appellants, William A. Burris and Philip M. Prinsen, recorded February 13, 2002 at Reel /Frame 012592/0514.

**2. RELATED APPEALS AND INTERFERENCES**

NONE.

**3. STATUS OF CLAIMS:**

Claims 1 – 5 and 7 - 31 remain rejected in the application. The rejections of claims 1 – 5 and 7 - 31 are appealed herein.

**4. STATUS OF AMENDMENTS:**

No amendment after Final Rejection was submitted. The claims stand as last amended by right by Appellants' submission on December 16, 2005, prior to the final rejection.

**5. SUMMARY OF CLAIMED SUBJECT MATTER:**

As set forth in the specification and claims, the present invention is directed to an "operatory water disinfection system" (Specification; ¶ 0002 [p. 1, lines 6-7]). Appellants further set forth advantages and aspects of the claimed invention in the Specification (Background and Summary sections), where it is stated that,

"There has been serious concern that microbial contamination of dental office water systems puts dental patients at risk of diseases... contamination results from growth of microbial biofilms on the inner surface of water lines. Such biofilms can include germs introduced from patients. Germs can slough off from biofilms as water passes through water lines. Thus, it is not uncommon for water coming out of dental hand pieces to have more than one million bacteria per milliliter while the water entering the dental lines has less than 100 bacteria per milliliter.

...

Our invention makes possible a small, low-cost and user-friendly ozone appliance for the professional dental office and other medical applications... Our invention introduces dissolved ozone into dental and surgical operatory water lines. This dissolved ozone attacks microbial contamination of water from dental and surgical operatory water lines and attached hand pieces and dispensing devices. Our system automatically kills waterborne germs and destroys biofilms where germs can hide and grow. It can, therefore, be used to disinfect water lines in dental operations and for other medical applications ...

Thus, the advantages of our ozone system are numerous. Ozone disinfection via our system is automatic, making it much more convenient for dental personnel. With our system, ozone disinfection automatically adjusts for variable water flow and quality. Further, ozone containing gas is separated from the water before the water is circulated with excess ozone converted to oxygen before venting. Moreover, ozone disinfection using our system does not depend on strict user compliance as our ozone system provides failure warning. In addition, ozone is the only disinfectant that can inactivate all pathogens in a short time. Ozone can destroy endotoxins produced by bacteria and destroy biofilms. (Microorganisms do not develop resistance to ozone). Finally, ozone is user friendly. It does not cause allergic reactions, has no offensive taste, and will not cause problems if accidentally ingested (unlike other disinfectants). It also stops gum bleeding and disinfects wound sites." (Specification; ¶¶ 0003 – 0006 [p. 1 lines 12-27])

Appellants further urge the distinctiveness and advantages of the present invention, including the advantages, as noted above and as specifically enumerated in the appended claims. Appellants respectfully contend that the various features set forth above, as claimed and supported by the disclosure of the present application, provide significant advantages to users of such systems – particularly as aids to disinfection. Appellants further submit the following information in support of the claimed features of the present application.

**Independent Claim 1:** Claim 1 is directed to a device for disinfecting operatory unit water and lines as depicted, for example, in Figs. 1 – 5, and as described, for example, at ¶¶ 0015 – 0028 (as published) [pp. 4-10 (as filed)] of the Specification. The liquid supply is described as a pressurized water line 21 or reservoir 22 in ¶ 0020 [p. 6, lines 11-22]. At ¶ 0016 [p. 4, line 25 – p. 5, line 7], the Specification indicates that,

“the device generates an ozone containing gas using corona discharge, preferably using the corona discharge generator 11 disclosed in Burris' U.S. Pat. No. 5,529,760. The corona discharge method is preferred over the ultraviolet (UV) method, because it can produce the much higher gas ozone concentration needed to achieve an ozone concentration in the liquid adequate for disinfection.”

(¶0016 [p. 4, line 25 – p. 5, line 7])

Liquid is prevented from entering the ozone generator 11 preferably by use of a porous hydrophobic material 18 or a check valve 19, as described in Specification ¶0019 [p. 5, line 29 – p. 6, line 10]. the ozone mixing system was described in detail in ¶0016 [p. 4, lines 17-24], where Appellants stated,

“The device dissolves the ozone in the liquid by mixing continuously during operation. (See mixing methods disclosed in Burris' U.S. Pat. Nos. 4,555,335; 5,207,993 and 5,213,773.) Our preferred mixing method uses a positive pressure pump 12 (such as a piston, rotary vane, diaphragm, or, preferably, a gear pump) in a liquid bypass. In the bypass mixing method, a liquid line 13 from the treatment chamber 14 and the line 9 from the ozone generator 11 come together at the pump 12 inlet. The mixing pump 12 mixes the ozone-containing gas and liquid and pumps both through the bypass line 15, which preferably includes a static mixer 16 back to the treatment chamber 14.”

(¶0016)

The circulation system that circulates the liquid containing dissolved ozone through a pressurized liquid circulation loop 6 connected to the operatory unit as described in detail at various locations in the Specification (see e.g., ¶¶ 0026 – 0027 [p. 9, line 17 – p. 10, line 29], 0029 [p. 11, lines 3-14]). Next, the separation system that separates

undissolved gas from the ozonated liquid prior to circulating the ozonated liquid is described, in part in ¶ 0019, which reads in part,

"...ozone containing gas is separated from the liquid after mixing, preferably by gravity in the treatment chamber 14. The alternative methods of using a porous hydrophobic material 54 or a float valve 51 will be discussed in more detail relative to FIG. 5. The separated gas is passed through an ozone reducing material 20 before the gas is released to the atmosphere. Thus, no ozone gas is released from the device to the atmosphere, and bubbles are eliminated from the liquid output line where they might cause problems. The gas/liquid separation is preferably conducted at minimal pressure to reduce the solubility of the gas and the tendency of bubble formation after the liquid is outputted to atmospheric pressure. Liquid is prevented from entering the ozone generator 11 preferably by use of a porous hydrophobic material 18 or a check valve 19..."

(Specification ¶ 0019 [p. 5, line 29 – p. 6, line 10]; emphasis added)

The recited reducing system that prevents ozone in the separated gas from escaping into the atmosphere is specifically indicated to accomplish the function by passing the gas through an ozone reducing material before venting. Support for this claim element is found, for example, at ¶¶ 0019 [p. 5, line 29 – p. 6, line 10] and 0027 [p. 9, line 34 – p. 10, line 29]. Lastly, several alternative embodiments of the recited liquid admitting system are described at the bottom of ¶ 0021 [p. 6, line 23 – p. 7, line 4].

**Dependent Claim 2:** Support for the pressure regulation means of dependent claim 2 is found, for example, at ¶¶ 0022 [p. 7, line 5 – p. 7, line 31] and 0027 [p. 9, line 34 – p. 10, line 29] where various pressure regulation means are described.

**Dependent Claim 3:** Claim 3, dependent from claim 1, specifically sets forth at least one connection in the pressurized liquid circulation passageway for outputting liquid with dissolved ozone. Support for the limitation is found in the description of the water outlet 17 (see Figs.) as well as the discussion of the operatory system, particularly the various devices set forth in ¶ 0022 [p. 7, lines 5-31] (handpieces 61, syringes 62, rinse cups 67, and cuspidor 63).



**Dependent Claim 4:** Claim 4 further sets forth the limitation of a control system (33) that causes the device to operate as desired to produce liquid containing dissolved ozone and to circulate and output liquid containing dissolved ozone as described, for example, in ¶0021 (see also Figs 1A, 2A and 3A).

**Dependent Claim 5:** Support for the limitation set forth in claim 5, that the "ozone generator is of a size sufficient to generate more ozone than can be dissolved in the liquid flow" is found in the Specification at ¶¶ 0016 [p. 4, line 25 – p. 5, line 7] and 0018 [p. 5, lines 22-28], where it is stated that "the concept is that when the device is turned on to make available ozonated liquid, the system operates continuously to produce more freshly ozonated liquid than the maximum that might be required."

**Dependent Claim 7:** The use of a positive pressure pump for mixing the ozone containing gas is described, for example, at ¶0016 [p. 4, line 25 – p. 5, line 7], where the device is described as dissolving the ozone in the liquid by mixing continuously during operation, and where various types of positive pressure pumps (12) are specifically enumerated.

**Dependent Claim 8:** Support for the static mixer recited in this dependent claim is found at the end of ¶0016 [p. 4, line 25 – p. 5, line 7], where static mixer 16 is described with respect to Fig. 1C, for example.

**Dependent Claim 9:** Claim 9 introduces a gas diffuser for mixing the ozone containing gas with the liquid. Support for the limitation is found, for example, at ¶0025 [p. 9, lines 1-16], where it is stated that a gas diffuser 57 of the embodiments depicted in Figs. 2(A-D) is preferably a fine bubble diffuser and that an advantage of this embodiment may be quieter operation.

**Dependent Claim 10:** Support for the recited "porous hydrophobic material" as a further definition of the separation system of claim 1, is found in ¶¶ 0019 [p. 5, line 29 – p. 6, line 10] and 0027 [p. 9, line 34 – p. 10, line 29], where the material 54 is set forth as an alternative to gravity in a treatment chamber or a float valve 51.

**Dependent Claim 11:** Similar to claim 10, support for the limitation that "undissolved ozone containing gas is separated from the ozonated liquid at near atmospheric pressure" is found in ¶0019 [p. 5, line 29 – p. 6, line 10], where the Specification indicates that, "[t]he gas/liquid separation is preferably conducted at minimal pressure

to reduce the solubility of the gas and the tendency of bubble formation after the liquid is outputted to atmospheric pressure.”

**Dependent Claims 12 and 13:** Claim 12 further defines the “reducing system” as set forth in claim 1, “wherein a barrier prevents liquid from entering the ozone reducing material.” Support for the recited limitation is found, for example, in ¶0019 [p. 5, line 29 – p. 6, line 10], where it is stated that “[t]he liquid is preferably prevented from entering the ozone reducing material 20 by use of a porous hydrophobic material 18 or 50. The use of porous hydrophobic materials, such as polytetrafluoroethylene, eliminates moving parts and thus improves reliability.” Claim 13 is supported by the general type of material recited in ¶0019, as well as the specific example given therein.

**Dependent Claims 14 and 15:** Claim 14 recites that “the source of the liquid provides pressure to circulate and output the ozonated liquid.” Claim 15 recites a “pump” that provides pressure to circulate and output the ozonated liquid. Support for such limitations is found, for example in ¶0020 [p. 6, lines 11-22], where alternative liquid sources are set forth and in ¶0022 [p. 7, lines 5-31] where the Specification teaches that “pressure and flow rate in the circulating liquid line is regulated by appropriately sizing the liquid passageways and the circulating pump 30 (if used) or by use of devices such as pressure regulators 27, pressure relief valves 28 and flow controllers 29” as depicted in the Figures.

**Dependent Claims 16 and 17:** Support for the “waste line” recited in claim 16 is found, for example, in ¶0022 [p. 7, lines 5-31], where the waste line 68 is described as allowing “ozonated liquid to flush and rinse the cuspidor 63.” Waste line 63 is further depicted in Fig. 6, where the cuspidor forms part of the waste line, as described in ¶0022.

**Dependent Claim 18:** Support for the recited limitation of “wherein a pump for withdrawing liquid containing dissolved ozone from the ozone mixing system recirculates the liquid under pressure through a loop that conducts the liquid back to the ozone mixing system,” is found in ¶0022 [p. 7, lines 5-31], and as depicted, for example, by pump 30 and liquid return 38 in the figures.

**Dependent Claims 19 and 20:** Paragraph 0024 [p. 8, lines 12-36] provides support for the recited limitations found in claim 19, where the Specification states that, “an ozone sensor 45 would be in the treated liquid passageway. The ozone sensor circuit

would provide assurance that the system is operating properly or warn if it is not. For example, the sensor circuit could activate an alarm such as a beeper 46 and or a lamp 47 if the ozone concentration falls too low.” Similarly, the balance of ¶0024 [p. 8, lines 12-36] provides support for the limitation of dependent claim 20 (dependent from claim 19), along with the illustrated of the dashed-line control signals as depicted, for example, in Figs. 1 through 4.

**Dependent Claim 21:** Support for the limitation of “wherein a valve controls the rate of output flow of the ozonated liquid” as recited in claim 21 is found, for example in ¶0022 [p. 7, lines 5-31], where reference to pressure relief valve 28 is found, along with the illustration of relief valve 28 in Figs. 1C and 2C.

**Dependent Claim 22:** Claim 22 recites “a porous hydrophobic barrier ... used to prevent liquid from entering the ozone generator.” A teaching of the recited limitation is found, for example, at ¶0019 [p. 5, line 29 – p. 6, line 10], where the Specification states that “[l]iquid is prevented from entering the ozone generator 11 preferably by use of a porous hydrophobic material 18 or a check valve 19.”

**Dependent Claims 23 and 24:** Support for the limitation that “the source of oxygen for the ozone generator is dried air supplied to the operatory unit” is found, for example, in ¶0017 [p. 5, lines 8-21], where various alternatives are described and where it is further stated that “[i]t would be advantageous to make use of the operatory supply of dry air 41 through regulator 40 to provide reduced dew point air for use in generating ozone in the device.” As to claim 24, the same paragraph further states, for example, that “[r]eplaceable desiccant cartridges 42 can be protected ... through the use of spring-loaded check valves 43 at the entrance and exit passageways to the cartridge.”

**Dependent Claim 25:** Claim 25 specifically recites “a control system responsive to a lack of supply water, for controlling at least the ozone generator and circulation system.” Support for such a limitation is respectfully urged to be found in ¶0021 [p. 6, line 23 – p. 7, line 4], where the alternative water sources are described and where the “pressure switch 32 or sensor can communicate with the control system 33 to signal a shortage of liquid supply and or shut down the operatory disinfection system,” and “a sensor, such as liquid level sensor 26, can communicate with a controller 33 to determine that the system has not put out any liquid for a predetermined period of time and can shut down the operatory disinfecting system ...”

**Dependent Claims 26, 27 and 28:** Support for the recited installation of a filter in the liquid passageway, as set forth in claim 26 is found, for example, in ¶0022 [p. 7, lines 5-31], where it is stated that “a filter 37 can be added to the water inlet line and/or to the pressurized liquid circulating passageway.” Claim 27, dependent from claim 26, further recites that “the liquid containing dissolved ozone is recirculated through a valved dispensing means.” This limitation is taught, for example, in the summary at ¶0005 [p. 2, lines 3-21], as well as in the specific dispensing devices set forth, for example, at ¶0022 [p. 7, lines 5-31] (dental hand pieces 61, syringes 62, rinse cups 67 and cuspidor 63). Claim 28 is dependent from claim 27, and further recites the limitation of the “valved dispensing means is located as near as possible to the point of use and is responsive to air pressure,” as taught at ¶0023 [p. 7, line 32 – p. 8, line 11]. More specifically, the Specification teaches “as detailed in FIG. 6, the flexible tubing 65 connecting the treated water supply to the hand pieces 61 and syringes 62 should have an extra lumen 66 so that ozonated water can be circulated continuously ... bring[ing] freshly ozonated water as close as possible to the point of use.”

**Dependent Claim 29:** Claim 29, dependent from claim 28, specifically sets forth the limitation that “the source of the air pressure is air used to drive a turbine in a hand piece.” Support for such a limitation is found, for example, in ¶0023 [p. 7, line 32 – p. 8, line 11] of the Specification.

**Dependent Claim 30:** Claim 30 recites “a control system and a sensor in communication with the control system, wherein liquid level in the treatment chamber is monitored by the sensor.” A control system 33, and a liquid level sensor (e.g., 26) in communication therewith, are depicted in Figs. 2(A-D), and generally described at ¶0020 [p. 6, lines 11-22].

**Dependent Claim 31:** Support for the control system turning off the claimed device in response to a period of non-use is described, for example, in ¶0021 [p. 6, line 36 – p. 7, line 4].

## **6. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL:**

Claims 1 - 5 and 7 – 31 remain rejected under 35 USC §103(a) as being unpatentable over Contreras U.S. Patent 5,824,243 (hereinafter “Contreras” in view of Burris U.S. Patent 5,207,993 (hereinafter “Burris ‘993”).

Claims 1 - 5 and 7 – 31 also remain rejected under 35 USC §103(a) as being unpatentable over Engelhard et al. U.S. Patent 5,942,125 (hereinafter “Engelhard”) in view of Burris '993.

**7. ARGUMENT:**

Several questions are presented in this appeal:

First, whether claims 1 - 5 and 7 – 31 were properly rejected under 35 USC §103(a) as being unpatentable over Contreras in view of Burris, including

- (a) whether the rejection under 35 USC §103(a) improperly combines two patents that teach away from one another and from the claimed invention, and
- (b) whether the rejection under 35 USC §103(a) omits elements recited in the rejected claims; and

Second, whether claims 1 - 5 and 7 – 31 were properly rejected under 35 USC §103(a) as being unpatentable over Engelhard in view of Burris, including

- (a) whether the rejection improperly relies upon a “reference” not expressly set forth in the basis of the rejection, and
- (b) whether the rejection under 35 USC §103(a) omits elements recited in the rejected claims.

**Rejection Under 35 U.S.C. §103**

Appellants respectfully submit that this invention is unique and has extensive application and utility. Under section 35 U. S. C. §103, the Patent and Trademark Office must make out a case of *prima facie* obviousness and it is incumbent upon Appellant to rebut that case with objective evidence of non-obviousness, *In re Tiffin and Erdman*, 170 USPQ 88 (CCPA, 1971). In determining the propriety of the Patent and Trademark Office's case of *prima facie* obviousness, it is necessary to ascertain whether or not the reference teachings would appear to be sufficient for one of ordinary skill in the relevant art having the references before him (her) to make the proposed substitution, combination or other modification. The conclusion of *prima facie* obviousness may be rebutted and the claimed subject matter ultimately held to be legally non-obvious if there are differences between the patent application and the prior art's motivation for adding an element, or if the claimed subject matter has

unexpectedly superior properties or advantages as compared to the prior art, *In re Lintner*, 173 USPQ 560, (CCPA, 1972).

It is well known that a determination of obviousness rests upon the answers to the factual inquiries set forth in *Graham v. John Deere Co.*, 383 US 1 (US Sup. Ct. 1966); scope and content of the prior art; differences between the prior art and the claims at issue; and level of ordinary skill in the art. In *Panduit Corp. v. Dennison Mfg. Co.*, 1 USPQ2d 1593 (Fed. Cir. 1987), the court stated that "[w]ith the involved facts determined, the decision maker confronts a ghost, i.e. "a person having ordinary skill in the art", not unlike the "reasonable man" and other ghosts in the law. To reach a proper conclusion under section 103, the decision maker must step backward in time and into the shoes worn by that "person" when the invention was unknown and just before it was made. In light of *all* the evidence, the decision maker must then determine whether the patent challenger has convincingly established, 35 U.S.C. 282, that the claimed invention as a whole would have been obvious at that time to that person. 35 U.S.C. §103. The answer to that question partakes more of the nature of law than of fact, for it is an ultimate conclusion based on a foundation formed of all the probative facts. If itself a fact, it would be part of its own foundation. . . . a prior patent must be considered in its entirety, i.e., as a *whole*, including portions that would lead away from the invention in suit." The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 16 USPQ2d 1430 (Fed. Cir. 1990; *emphasis added*). Although a prior art device "may be capable of being modified to run the way the apparatus is claimed, there must be a suggestion or motivation in the reference to do so." *Id.* at 1432.

Finally, the Examiner may not use the Appellant's disclosure as a recipe for selecting portions of the "prior art" to construct Appellant's claimed invention. A piecemeal reconstruction of the prior art patents in light of Appellant's disclosure is not a basis for a holding of obviousness, *In re Kamm et al.*, 172 USPQ 298 (CCPA, 1972). The mere fact that the prior art could have been modified does not make the modification obvious unless the prior art suggested the desirability of such a modification, *In re Gordon*, 221 USPQ 1125, (Fed. Cir. 1984); *Jones v. Hardy*, 220 USPQ 1021, (Fed. Cir. 1984). Moreover, this teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and

not based on the Appellant's disclosure. *In re Vaeck*, 20 USPQ2d 1438 (Fed. Cir. 1991).

**Were claims 1 - 5 and 7 – 31 properly rejected under 35 USC §103(a) as being unpatentable over Contreras in view of Burris? (1<sup>st</sup> Question)**

As previously submitted by Appellants, Contreras discloses a storage tank of water and a device for introducing ozone into the water in the storage tank (e.g., Abstract) and further discloses continuously ozonating and circulating the ozonated water (col. 2, lines 18-20; col. 3, line 57 – col.4, line 8). Contreras teaches that,

“actively ozonated water is to flow from the tap,”

and that excess ozone is handled by

“flexible tube 26 connected ... and fed into the storage tank 2 so that the hose [flexible tube 26] is positioned near the bottom of the lid 9 to capture and reuse any excess ozone, thus leaving no waste.”

(Contreras; column 4, lines 5-15)

As previously noted by the Examiner “active” means water containing ozone in its active state. Contreras further suggests that ozone is discharged with the treated water from the tap (col. 2, lines 25-27), which is contrary to, and teaches away from, the vent and reducing system as presently recited in the claims.

The rejection also relies upon the teachings of Burris '993, although Burris '993 is directed to a batch system for disinfection of a liquid. In response to Appellants' prior arguments in this regard, the Examiner alleged in the Advisory Action that Contreras' teaching of periodic or continuous application of ozone is suggestive of a batch system. Appellants respectfully maintain that such a position ignores Contreras' teaching of immediate replenishment of any water used (col. 2, lines 53-55) – which is simply not a batch processing system. On the other hand, Burris '993 is directed to equipment for purifying batches of liquid with ozone - when the liquid is allowed the time for purification to take place.

**(a) Improper combination of patents that teach away from one another and from the claimed invention**

Appellants respectfully submit that the rejection under 35 USC §103(a) must fail because Contreras and Burris '993 are not properly combined so as to establish

*prima facie* obviousness. More specifically, the two patents teach away from one another and fail to support the combination/modification urged as the basis for the rejection. In the Final Office Action, the Examiner urges the following as the basis for the combination:

It would have been well within the purview of one of ordinary skill in the art to employ the ozone off-gas destruction means of Burris in the system of Contreras, because it would provide for the safe disposal of that off-gas if the system requires abrupt shut-down which would not allow for the time consuming, natural dissipation of the off-gas as required by return of the off-gas to the reservoir.

*Final Office Action; p. 3*

It remains unclear as to what basis the Examiner relies upon for such a suggestion. Appellants further maintain that no basis has been set forth for a modification in the teachings of Contreras to prevent the release of ozone into the atmosphere when Contreras states,

4

water is circulated from the storage tank through the dispensing system to a point directly anterior to the tap, and back through the storage tank. This circulation of ozonated water eliminates any dead volume between the ozonating mechanism and the tap. Consequently, this embodiment of the ozonating system will provide actively ozonated water virtually instantaneously with the initial flow of water from the tap. Moreover, the use of a suitable reservoir ensures that the water has been thoroughly ozonated, and ozonated for a period of time sufficient to decontaminate and sterilize the water. Provisions to handle any ozone off gas is provided by utilizing the venturi 16 with a flexible tube 26 connected from the other suction port and feed into the storage tank 2 so that the hose is positioned near the bottom of the lid 9 to capture and reuse any excess ozone, thus leaving no waste. For low flow rates a single port venturi 28 with a "Y" 29 connection will be used with one tubing connected to the ozonator 17 and the other to reuse the off gas from the storage tank 2. Finally, 30 identifies the out going water line which is connected to the main service line serving all user points.

*Contreras; col. 4, lines 1-20*



Contreras clearly contemplates the dispensing of actively ozonated water, and one of ordinary skill in the art would not have been motivated to make the alleged combination in view of the contrary teachings of Contreras and Burris '993.

Appellants further continue to urge that one skilled in the art could only conclude that Contreras teaches that ozone is output with the water. Contreras teaches away from the recited limitations of independent claim 1 as well, which require "a separation system that separates undissolved gas from the ozonated liquid prior to circulating the ozonated liquid through the circulation passageway; a reducing system that prevents ozone in the separated gas from escaping into the atmosphere by passing the gas through an ozone reducing material before venting" (underlining added).

In response to Appellant's prior challenge to the motivation to combine and modify the teachings of the referenced patents, the Examiner stated that the motivation "is to protect users of the system in the case of an emergency or maintenance shutdown of the system." (Final Office Action, p. 5) Appellants remain unable to identify where the Examiner finds such a teaching or suggestion, and the Examiner now apparently suggests a "common sense" motivation – again ignoring Contreras' teaching of dispensing actively ozonated liquid. At best, Appellants understand that Contreras makes no mention of the need or desirability to vent or reduce ozone. Nonetheless, the Examiner, although recognizing Contreras' teaching of reusing the excess ozone collected through hose 26 is different than venting, further seeks to base the rejection on an unsupported conclusion of alleged obviousness to replace the old ozone with new ozone. Appellants respectfully urge that the Examiner has provided no support for such a conclusion. It is, therefore, apparent that the Examiner is relying upon the claim limitations of the present application as the basis for making the proposed combination. *Prima facie* obviousness may not be established by relying on the teachings of Appellants' claims.

Moreover, the previously alleged reason for the combination also admitted to Contreras' contrary teachings – indeed it appears to "allow for ... natural dissipation of the off-gas as required by return of the off-gas to the reservoir." Why would one of skill in the art be motivated to provide the reduction and venting of the Burris '993 batch system if Contreras is indeed returning gas to the reservoir and allowing for its natural dissipation?

Appellants further submit that the standard for obviousness is that “the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art,” not “well within the purview of one of ordinary skill in the art” as set forth in the Final Office Action, and urge that the Examiner has applied an incorrect standard for obviousness. Accordingly the rejection should be overturned as being a misstatement as well as unsupported.

**(b) Omission, in the rejection, of elements recited in the rejected claims**

Burris '993 is directed to equipment for purifying batches of liquid with ozone - when the liquid is allowed the time for purification to take place.

Thus, Burris '993 does not appear to disclose the output of a disinfecting liquid as does Contreras. In response the Examiner urged that the teachings of Burris '993, particularly col. 2, lines 39-40, suggest the same. However, when read in context, this language cited by the Examiner clearly indicates it is the water or liquid that is to be purified or disinfected, not that the water is used for disinfection. Furthermore Burris '993 indicates that it is undesirable to vent ozone directly to the atmosphere without changing it to oxygen (col. 3, lines 24-27). Burris '993 makes it clear that liquid cannot enter the ozone reducer 23 (col. 3, lines 44-56).

Considering, *in arguendo*, the combination of Contreras in view of Burris '993, Appellants contend that, at best, the arguable combination fails to teach a circulation system that circulates liquid containing dissolved ozone and a separation system that separates undissolved gas from the ozonated liquid prior to circulating the ozonated liquid through the circulation passageway – neither of the patents relied upon expressly indicate such a feature. Accordingly, claim 1 is respectfully submitted to be patentably distinguishable over the arguable combination of Contreras in view of Burris '993 and the rejection is traversed.

Appellants note that several prior responses set forth, in detail, Appellants' position relative to claims dependent from claim 1. Appellants also submit that the Advisory Action sets forth, for the first time, specific sections relied upon for teaching the recited limitations. Appellants now address such rejections, including the alleged intrinsic and inherent teachings, herein for the separately patentable dependent claims, in which the following are separately set forth and argued in this appeal.

*Claim 2* – Considering the present rejection, Appellants respectfully submit that the limitation of “pressure regulation means maintains proper pressure in the liquid circulation passageway,” as set forth in the claim, has not been established. Although “a pressure regulator 21 to set the demand line pressure” (Contreras; col. 3, line 49) is disclosed, it is not believed that such a teaching suggests use in a liquid circulation passageway as recited by the rejected claim. Accordingly, dependent claim 2 is respectfully urged to be patentably distinguishable of the arguable combination.

*Claim 4* – As to claim 4, the rejection (Final Action; p. 2) indicates that Contreras teaches “[c]ontrol means ... further provided to control activation, operation and delivery of the water.” Appellants are unable to identify what basis the Examiner relies upon for the recited control means as the term does not appear to be used in Contreras. Accordingly, the rejection fails to set forth where the recited limitations are found in the patents relied upon for the rejection.

*Claim 5* – The Final Office Action failed to indicate what teaching was relied upon as the basis for the rejection of dependent claim 5. Moreover, the Advisory Action (p. 2, lines 7-9) acknowledges that Contreras does not disclose the use of excess ozone, and thus Applicants respectfully maintain that Contreras cannot be relied upon for teaching the recited limitation of “more ozone than can be dissolved in the liquid flow.” Applicants further direct attention to ¶0018 [p. 5, lines 22-28] of the Specification, which teaches that “... the system operates continuously to produce more freshly ozonated liquid than the maximum that might be required. With a constant flow of ozone containing gas in excess of what can be dissolved according to Henry's law, the ozone concentration in the liquid is maintained at the desired level during the operation of the device. One of the great advantages of ozone is that according to Henry's law, the dissolved ozone concentration is determined by the partial pressure of ozone in the gas rather than the amount of ozone so long as there is an excess of ozone.” (emphasis added) Notably, Contreras also fails to teach a recognition of the advantage of maintaining excess ozone, and should not be construed as giving rise to the limitations set forth in claim 5.

*Claims 12 and 13* – Considering the rejection of claim 12, the Advisory Action appears to indicate that the rejection of claim 12 is based upon the obvious insertion of the Burris '993 reduction catalyst into tubing 26. Specifically, “[t]he combination

with Burris properly provides the ozone reducer in that line ...” is asserted as the basis for the rejection. However, the Examiner fails to address the inherent problem with inserting the ozone reducer of Burris ‘993 in the line 26, which is used to inject excess ozone back into the liquid as taught by Contreras. Why would one be motivated to make such a change as it would defeat the use of line 26? Relative to the rejection of claim 13, in addition to being dependent from claim 12 (barrier prevents liquid from entering ozone reducing material), the claim further recites “a porous hydrophobic barrier.” In the rejection, the Examiner urges that it would have been obvious to substitute a porous hydrophobic barrier for a check valve “because it would provide a more simply [sic] means of protecting the generator....” Here again, the rejection sets forth no citation to where such a suggestion is found in Contreras or why one would be motivated to consider the use of a reduction catalyst with a barrier in a line intended to return excess ozone gas to a venturi 16.

Appellants further urge that Contreras’ teaching of a venturi system as the means for introducing ozone into the liquid would not permit the substitution of a hydrophobic material for the check valve. More specifically, claims 12 and 13 deal with protecting the ozone reducing means, and not with protecting the ozone generator. Contreras simply does not have ozone reducing material to protect, nor would one be motivated to put such material into a line that supplies excess ozone to the venturi. Absent such an indication, Appellants urge that *prima facie* obviousness has not been established and respectfully request withdrawal of this rejection of claims 12 and 13.

*Claim 14* - As to claim 14, Appellants continue to urge that the rejection fails to set forth any teaching of the use of the liquid source providing pressure to circulate and output the ozonated liquid. While the batch system of Burris ‘993 does teach that reservoir 36 can be refilled from a pressurized supply line via a valve, this does not, Appellants maintain, give rise to the recited limitations of claim 14, “wherein the source of the liquid provides pressure to circulate and output the ozonated liquid.” Accordingly, Appellants respectfully submit that *prima facie* obviousness has not been established and respectfully request withdrawal of this rejection of claim 14.

*Claim 16* - claim 16 recites a waste line, where liquid that is not output for use from the pressurized liquid circulation passageway is directed to a waste line. No such teaching was previously identified by the Examiner in the teachings of Contreras or

Burris '993. In the Advisory Action the Examiner urges, that the recitation of a drain 57 from a reservoir 36 in Burris '993 results in the recited limitation found in claim 16. Appellants respectfully contend that the reservoir drain of Burris '993 is not a pressurized liquid circulation passageway as recited in the limitations of claim 16.

*Claim 17* – This claim, dependent from claim 16, further adds the limitation that the ozonated liquid rinses a cuspidor before entering the waste line of claim 16. Here again, the alleged teaching of this limitation has only been set forth in the Advisory Action, where the Examiner has now urged that Contreras teaching of the use of the invention for dental operatory procedures (Abstract) intrinsically includes the provision of a cuspidor drain structure. Appellants respectfully contend that the Examiner is relying on an inherency argument but has failed to set forth the requisite proof that no alternatives are available. The Examiner has failed to make the requisite case for an inherency rejection as set forth in MPEP 2112, and has not established that the use of a cuspidor is necessary in Contreras.

*Claim 19* - Relative to claim 19, and claim 20 dependent therefrom, this claim further recites an ozone sensor connected to an alarm. Once again, Appellants do not believe the rejection has identified where such limitations are taught by either Contreras or Burris '993. In response the Examiner indicates that the rejection is based upon Burris '993, col. 2, lines 23-33, yet Appellants cannot find any reference therein to an alarm. Accordingly, Appellants respectfully maintain that the rejection of claim 19 over Contreras in view of Burris '993 is incomplete and that the finality of the Office Action is also premature. Reversal of the rejection of claims 19 and 20 is respectfully requested.

*Claims 23 and 24* - Considering claim 23, again Appellants respectfully maintain that the rejection fails to set forth any indication as to where a teaching of the use of operatory unit dried air as the source of oxygen for the ozone generator is found in the patents relied upon for the rejection. Appellants know that Burris '993 suggests the use of a dryer, but urge that such a teaching does not give rise to the specific limitations set forth in claim 23. Relative to claim 24, the rejection (Advisory Action) has not identified a teaching of valves that protect a desiccant from moist air when the device is not being operated. Absent such a teaching or suggestion *prima facie*

obviousness has not been established, and claims 23 and 24 are patentably distinguishable over the arguable combination, and the rejection should be reversed.

*Claim 25* - With respect to claim 25, although the rejection broadly suggests that "control means are further provided to control activation, operation and delivery of the water" (Final Office Action, p. 2), no supporting disclosure has been identified in the rejection. In the Advisory Action, the Examiner indicates that the limitations are taught at Burris '993, col. 2, lines 23-33. Appellants remain confused as to what the Examiner urges, particularly at col. 2, lines 23-33, as teaching a control system responsive to a lack of supply water – such a feature is not believed to be taught by either patent relied upon for the rejection. Hence, the rejection of claim 25 is, at best, incomplete and Appellants respectfully request reversal of the rejection.

*Claims 27, 28 and 29* - Claims 27 – 29 include further limitations with respect to the device, and specifically recite valved dispensing means and response to air pressure to a hand piece. Once again, no such teaching has been identified in the patents relied upon as the basis for the rejection. Only in the Advisory Action does the Examiner attempt to suggest that the basis for the rejection is intrinsically included, or in other words inherent, in the teachings found in the Abstract of Contreras. As previously noted, the Examiner has failed to establish that each of the cited limitations set forth in claims 27 (valved dispensing means), 28 (dispensing means located near point of use and responsive to air pressure) and 29 (air pressure used to drive turbine in hand piece) are necessary as a result of the Abstract's suggestion that "[t]his invention has many applications [sic] but not limited to the following: ...; dental operatory procedures; ..." (Contreras; Abstract, lines 11-16). Absent such teaching *prima facie* obviousness has not been established and Appellants respectfully urge that claims 27 – 29 are patentably distinguishable over the arguable combination of Contreras in view of Burris '993.

*Claims 30 and 31* – As to claims 30 and 31, the rejection is apparently relied upon to suggest that Contreras teaches "[c]ontrol means ... further provided to control activation, operation and delivery of the water." As previously noted, Appellants are unable to identify what basis the Examiner relies upon for the recited control means as the term does not appear to be used in Contreras. Furthermore, no teaching has been set forth to disclose or suggest the limitation of "a control system and a sensor

in communication with the control system, wherein liquid level in the treatment chamber is monitored by the sensor" as found in claim 30, or "further including a control system wherein the control system, in response to a period of non-use, turns the device off" as set forth in claim 31, dependent therefrom. Accordingly, the rejection fails to set forth where the recited limitations are found in the patents relied upon for the rejection and the rejection should be reversed.

**Were claims 1 - 5 and 7 – 31 properly rejected under 35 USC §103(a) as being unpatentable over Engelhard in view of Burris? (2<sup>nd</sup> Question)**

Considering the rejection over the arguable combination of Engelhard et al. in view of Burris '993, Engelhard is directed to an ozone generator that provides an outflow of ozone enriched air introduced to a water source through a sparger. The ozonated water is conveyed through water lines to each of the various handpieces or implements used by a dentist during the normal course of providing dental services. Engelhard, like Contreras, also relies on the circulation of ozonated water having undissolved ozone gas therein. Such a teaching is found, for example, in the Abstract and at col. 3, lines 53-56, where Engelhard clearly indicates that the ozone enriched air is entrained in the water in bubbles. Appellants respectfully contend that the term "entrained" is understood to teach the presence of bubbles containing ozone enriched air. As noted above, such a teaching is contrary to Burris '993 (no circulation of ozone gas in water), and Appellants respectfully urge that the patents are not properly combined.

Appellants further note that this failure to establish *prima facie* obviousness was indicated in Appellants' prior responses. Appellants respectfully maintain (see *In Re Lintner*) that it is necessary to ascertain whether or not the reference teachings would appear to be sufficient for one of ordinary skill in the relevant art to make the proposed substitution, combination or other modification. Furthermore, MPEP 2144.03 indicates that as noted by the court in *Ahlert*, any facts Officially Noticed should be of notorious character and serve only to "fill in the gaps" in an insubstantial manner which might exist in the evidentiary showing made by the examiner to support a particular ground for rejection. It is never appropriate to rely solely on common knowledge in the art without evidentiary support in the record as the

principal evidence upon which a rejection was based. *See Zurko, 258 F.3d at 1386, 59 USPQ2d at 1697; Ahlert, 424 F.2d at 1092, 165 USPQ 421.*

**(a) rejection improperly relies upon a “reference” not made of record**

Appellants continue to urge that the rejection improperly relies on teachings from Contreras for the suggestion that a UV ozone generator may be substituted for a corona generator. The Advisory Action sets forth the Examiner's reliance on Contreras to suggest the modification of Engelhard (i.e., as the basis to urge the substitution of Engelhard's UV Generator with a generator disclosed by Burris '993). Appellants again submit that Contreras has not been set forth in the rejection, and that reliance upon Contreras is improper unless set forth, and it is further shown that it would have been obvious to make the proposed modification. Absent such teachings, Appellants again urge that *prima facie* obviousness has not been established, and the rejection is respectfully traversed.

Appellants, in response to the Examiner's Advisory Action remarks, continue to maintain that in spite of the fact that both types of generators may be used to produce ozone (at levels that differ by a factor of ten), it would not have been obvious to one of ordinary skill in the art to make the proposed substitution as to do so would impact the performance of the device and would require an entirely redesigned system. Appellants refer to and incorporate in this Appeal Brief the Exhibit submitted with the Response After Final. Appellants, therefore, maintain that the proposed substitution, suggested by the Examiner, would not be an obvious substitution.

Moreover, one skilled in the art would not have been motivated to substitute the UV generator taught by Engelhard with the corona discharge generator of Burris '993 because the change in concentrations of ozone produced would require significant alterations to the designs of such systems. In other words, the substitution would require modification on a scale so as to preclude one of skill in the art from considering such a substitution. Absent a specific teaching to suggest the proposed substitution, Appellants respectfully urge that the present claims are again being used as the “recipe” from which elements of unrelated systems are urged for combination and modification. Accordingly, Appellants respectfully traverse the rejection.



**(b) Omission, in the rejection, of elements recited in the rejected claims**

Considering, *in arguendo*, the combination of Engelhard in view of Burris '993, Appellants contend that, at best, the arguable combination still fails to teach a circulation system that circulates liquid containing dissolved ozone and a separation system that separates undissolved gas from the ozonated liquid prior to circulating the ozonated liquid through the circulation passageway – neither Engelhard or Burris '993, alone or in combination appear to expressly indicate the claimed features. Accordingly, claim 1 is respectfully submitted to be patentably distinguishable over the arguable combination of Engelhard in view of Burris '993 and the Board is requested to reverse the rejection.

Appellants further submit that the rejections set forth in the Office Action are again incomplete relative to the dependent claims. Furthermore, the Advisory Action indicates that the Examiner relies upon Burris '993 as the basis for rejecting claims 8, 14, 16-17, 19, 23 and 25, but ignores the limitations of the other dependent claims (e.g., claims 27-29) - or perhaps relies upon Contreras as the basis for such rejections? As Contreras has not been applied to the current rejection,, some of the dependent claims are either clearly allowable over the rejection based upon Engelhard in view of Burris '993, or the rejection remains incomplete in failing to indicate a reliance on Contreras as well. In any event, Appellants urge that *prima facie* obviousness has not been established relative to the limitations of all the dependent claims, including those separately set forth and argued below.

Appellants now address the rejection for the separately patentable dependent claims, in which the following are separately set forth and argued in this appeal.

*Claim 5* – The Final Office Action alleged that Engelhard teaches generating more ozone than can be dissolved, but once again failed to identify where such a teaching was found in Engelhard. Applicants again direct attention to ¶0018 [p. 5, lines 22-28] of the instant Specification, which provides the basis for the claim limitation and specifically teaches that "... the system operates continuously to produce more freshly ozonated liquid than the maximum that might be required. With a constant flow of ozone containing gas in excess of what can be dissolved according to Henry's law, the ozone concentration in the liquid is maintained at the desired level during the operation of the device. One of the great advantages of ozone is that according to

Henry's law, the dissolved ozone concentration is determined by the partial pressure of ozone in the gas rather than the amount of ozone so long as there is an excess of ozone." (emphasis added) Appellants respectfully urge that Engelhard also fails to teach a recognition of the advantage of maintaining excess ozone, and should not be construed as giving rise to the limitations set forth in claim 5. Thus *prima facie* obviousness has not been established relative to claim 5.

*Claim 8* - The rejection fails to set forth a teaching of a static mixer as recited in claim 8. Appellants are unable to find the term "static mixer" in Engelhard. Appellants respectfully request that the Examiner's failure to identify where the claimed limitation is set forth, or which patent is relied upon as the basis for the teaching renders the rejection incomplete, and *prima facie* obviousness has not been established.

*Claim 14* - As to claim 14, Appellants urge that the rejection fails to set forth any teaching of the use of the liquid source providing pressure to circulate and output the ozonated liquid.

*Claims 16 and 17* - Amended claim 16 recites a waste line, where liquid that is not output for use from the pressurized liquid circulation passageway is directed to the waste line. No such limitation was identified by the Examiner in the teachings of Engelhard or Burris '993. Claim 17, dependent from claim 16, further recites the limitation that the ozonated liquid rinses a cuspidor before entering the waste line of claim 16. Here again, the limitations of these dependent claims have not been set forth in the rejection and the finality of the present Office Action is urged to be premature. Appellants respectfully request the rejection be reversed by the Board.

*Claim 19* - Relative to claim 19, the claim further recites an ozone sensor connected to an alarm. Once again, Appellants do not believe the rejection has identified where such a limitation is taught by Engelhard. Absent such teaching *prima facie* obviousness has not been established. Accordingly, Appellants respectfully maintain that the rejection of claim 19 over Engelhard in view of Burris '993 is incomplete and request the rejection be reversed.

*Claim 23* - Considering claim 23, again Appellants respectfully contend that the rejection fails to set forth a teaching of the use of operatory unit dried air as the source of oxygen for the ozone generator. Absent such teaching claim 23 is patentably distinguishable over the arguable combination and Appellants respectfully request that the Board reverse the rejection of this dependent claim.

*Claim 25* - With respect to claim 25, a control system responsive to a lack of supply water is not believed to be taught by Engelhard or Burris '993 relied upon for the rejection. Absent the identification of the teaching relied upon *prima facie* obviousness has not been established so as to permit Appellants an opportunity to respond. Accordingly, the rejection of claim 25 fails to establish *prima facie* obviousness, and Appellants respectfully request that the rejection be reversed.

*Claims 27, 28 and 29* - Claims 27 – 29 include further limitations with respect to the device, and specifically recite valved dispensing means and response to air pressure to a hand piece. Once again, no such teaching has been identified in the patents relied upon as the basis for the rejection. Only in the Advisory Action does the Examiner attempt to suggest that the basis for the rejection is intrinsically included, or in other words inherent, in the teachings found in the Abstract of Contreras, yet Appellants once again note that Contreras is not made part of the present rejection. As previously noted, the Examiner fails to establish that each of the cited limitations set forth in claims 27 (valved dispensing means), 28 (dispensing means located near point of use and responsive to air pressure) and 29 (air pressure used to drive turbine in hand piece) are disclosed by Engelhard or Burris '993. Absent such teaching *prima facie* obviousness has not been established and Appellants respectfully urge that claims 27 – 29 are patentably distinguishable over the arguable combination of Engelhard in view of Burris '993.

*Claims 30 and 31* – As to claims 30 and 31, no teaching has been set forth to disclose or suggest the limitation of “a control system and a sensor in communication with the control system, wherein liquid level in the treatment chamber is monitored by the sensor” as found in claim 30, or “further including a control system wherein the control system, in response to a period of non-use, turns the device off” as set forth in claim 31, dependent therefrom. Accordingly, the rejection fails to set forth where

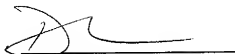
the recited limitations are found in the patents relied upon for the rejection and the rejection should be reversed.

### **Conclusion**

As set forth above, claims 1 - 5 and 7 - 31 were improperly rejected under 35 USC §103(a) as being unpatentable over Contreras in view of Burris '993. In particular, the rejection under 35 USC §103(a) improperly combined the patents when they teach away from one another. In the alternative, when considered, *in arguendo*, the rejection under 35 USC §103(a) combining Contreras in view of Burris '993 omitted elements recited in the rejected claims. Second, claims 1 - 5 and 7 - 31 were also improperly rejected under 35 USC §103(a) as being unpatentable over Engelhard in view of Burris '993, and even if considered *in arguendo*, the combination fails to teach specific limitations set forth in the claims. Appellants further urge that the dependent claims, as separately argued herein, are also patentably distinguishable over the arguable combinations as set forth in detail, and request that the Board consider the dependent claims separately on their merits.

In light of the various arguments set forth above, Appellants respectfully submit that all of the questions presented should be answered in the negative, that all rejections set forth should be reversed, and that Appellants' pending claims should be indicated as allowable.

Respectfully submitted,



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**8. CLAIMS APPENDIX:**

*The following are the appealed claims:*

1. A device for disinfecting operatory unit water and lines, comprising:
  - a liquid source such as a pressurized water line or a reservoir;
  - an ozone generator using a corona discharge to produce an ozone containing gas;
  - a protection system that prevents liquid from the liquid source from entering the ozone generator;
  - an ozone mixing system that mixes and dissolves the ozone containing gas in the liquid;
  - a circulation system that circulates the liquid containing dissolved ozone through a pressurized liquid circulation loop connected to the operatory unit;
  - a separation system that separates undissolved gas from the ozonated liquid prior to circulating the ozonated liquid through the circulation passageway;
  - a reducing system that prevents ozone in the separated gas from escaping into the atmosphere by passing the gas through an ozone reducing material before venting; and
  - a liquid admitting system that inputs liquid from the liquid source into the mixing system to replace liquid output to the operatory unit.
2. The device of claim 1 wherein pressure regulation means maintains proper pressure in the liquid circulation passageway.
3. The device of claim 1 wherein there is at least one connection in the pressurized liquid circulation passageway for outputting liquid with dissolved ozone.

4. The device of claim 1 wherein a control system causes the device to operate as desired to produce liquid containing dissolved ozone and to circulate and output liquid containing dissolved ozone.

5. The device of claim 1 wherein said ozone generator is of a size sufficient to generate more ozone than can be dissolved in the liquid flow.

6. (canceled)

7. The device of claim 1 wherein the ozone containing gas is mixed with the liquid by use of a positive pressure pump.

8. The device of claim 1 wherein the ozone containing gas is further mixed with the liquid by use of a static mixer.

9. The device of claim 1 wherein the ozone containing gas is mixed with the liquid by use of a gas diffuser.

10. The device of claim 1 wherein undissolved ozone containing gas is separated from the liquid by use of a porous hydrophobic material

11. The device of claim 1 wherein undissolved ozone containing gas is separated from the ozonated liquid at near atmospheric pressure.

12. The device of claim 1 wherein a barrier prevents liquid from entering the ozone reducing material.

13. The device of claim 12 wherein liquid is prevented from entering the ozone reducing material by use of a porous hydrophobic barrier.

14. The device of claim 1 wherein the source of the liquid provides pressure to circulate and output the ozonated liquid.

15. The device of claim 1 wherein a pump provides pressure to circulate and output the ozonated liquid.

16. The device of claim 1 further including a waste line, wherein said circulation system circulates the ozonated liquid through the pressurized liquid circulation passageway and liquid that is not output for use from said pressurized liquid circulation passageway is directed to the waste line.

17. The device of claim 16 further including a cuspidor draining into the waste line, wherein the ozonated liquid that is directed to a waste line is directed to rinse the cuspidor before entering the waste line.

18. The device of claim 1 wherein a pump for withdrawing liquid containing dissolved ozone from the ozone mixing system recirculates the liquid under pressure through a loop that conducts the liquid back to the ozone mixing system.

19. The device of claim 1 further including an ozone sensor in said liquid circulation passageway, the ozone sensor connected to an alarm to indicate whether the device is operating properly.

20. The device of claim 19 wherein the ozone generator and ozone mixing system are responsive to the ozone sensor.

21. The device of claim 1 wherein a valve controls the rate of output flow of the ozonated liquid.

22. The device of claim 1 wherein a porous hydrophobic barrier is used to prevent liquid from entering the ozone generator.

23. The device of claim 1 wherein the ozone generator uses oxygen to produce an ozone containing gas and where the source of oxygen for the ozone generator is dried air supplied to the operatory unit.

24. The device of claim 1 wherein air is dried by a desiccant protected from moist air by valves when the device is not being operated.

25. The device of claim 1 further including a control system responsive to a lack of supply water, for controlling at least the ozone generator and circulation system.

26. The device of claim 1 wherein a filter is installed in the liquid passageway.

27. The device of claim 1 wherein liquid containing dissolved ozone is recirculated through a valved dispensing means.

28. The device of claim 27 wherein the valved dispensing means is located as near as possible to the point of use and is responsive to air pressure.

29. The device of claim 28 wherein the source of the air pressure is air used to drive a turbine in a hand piece.

30. The device of claim 1 further including a control system and a sensor in communication with the control system, wherein liquid level in the treatment chamber is monitored by the sensor.

31. The device of claim 1 further including a control system wherein the control system, in response to a period of non-use, turns the device off.



**9. EVIDENCE APPENDIX:**

NONE

**10. RELATED PROCEEDINGS APPENDIX:**

NONE